IRENA
International Renewable Energy Agency

RENEWABLE SHIPPING SOLUTIONS

BACKBONE OF GLOBAL TRADE… AND LIFELINE FOR ISLAND COMMUNITIES

The shipping industry plays a critical role in the global economy, carrying approximately 90% of the tonnage of all traded goods, as estimated by the International Chamber of Shipping. Island communities in particular depend heavily on shipping for transportation.

Demand for shipping is predicted to grow further, owing to the changing configuration of global production, the increasing importance of global supply chains and expected growth in many economies.

EMISSIONS RISING WITH SHIPPING DEMAND

Within the past 150 years, shipping propulsion has undergone significant transformations: from renewable energy (sail power) to steam (coal power) to heavy fuel oil (HFO) and marine diesel oil (MDO), now the dominant fuels.

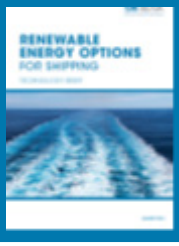
- In 2010, the world's marine fleet burned 370 million tonnes of diesel and was estimated to contribute at least 3% of global greenhouse gas emissions.
- Compared to other modes of transport, shipping produces the lowest emissions of CO_2. Emissions are expected to rise, however, with shipping demand and could triple by 2050 if left unchecked.
- The International Convention for the Prevention of Pollution from Ships (MARPOL) has stipulated mandatory technical and operation measures which require ships to be more efficient in energy use and emissions reduction.
- Rising bunker fuel prices, amid a globally volatile market, provide another compelling reason to scale up modern shipping solutions based on renewable sources and technologies.

CLEAN SHIPS ON THE CUSP OF REALITY

Renewable energy can transform the global shipping fleet at all levels and scales, including: international and domestic transport of goods, people and services; fishing; tourism and other maritime pursuits.

- Renewable power applications for ships of all sizes include options for primary or hybrid propulsion, as well as on-board and shore-side energy use.
- Renewables can be integrated through retrofits to the existing fleet or incorporation into new shipbuilding and design, with a small number of new ships striving for 100% renewable energy or zero-emissions technology for primary propulsion in the long run.
- The contribution of renewables to the energy mix of the shipping sector is limited in the near and medium terms. There is however strong potential in selected applications.
- The International Maritime Organisation requires new ships to improve energy efficiency by 30% by 2030.
- The transition to a clean energy shipping sector requires a significant shift from fossil fuel-powered transport to energy-efficient designs and renewable energy technologies, starting today.

RENEWABLE ENERGY OPTIONS FOR SHIPPING: TECHNOLOGY BRIEF



A new IRENA technology brief summarises the current status and applications of renewable energy solutions for shipping, along with barriers and opportunities for further deployment. The brief provides recommendations to policy makers on promoting realistic renewable energy solutions, which can support energy efficiency and reduced emissions in the important and growing shipping sector.

POLICY RECOMMENDATIONS

- Support policies and incentives to promote research, innovation and proof-of-concept examples are crucial in order for renewable energy shipping solutions to reach commercial viability.
- For quick-win renewable solutions, support should focus on small ships (less than 10,000 dead weight tonnes), which remain more prevalent around the world, transporting less of the total cargo but emitting more greenhouse gasses per unit of cargo and distance travelled, compared to larger ships.

SUMMARY TABLE: RENEWABLE ENERGY APPLICATIONS AND THEIR POTENTIAL FOR SHIPPING

Renewable energy type		Retrofit (RF)/ New Build (NB)	< 400 tonne e.g., recreation, artisanal/small fishery, tourism, passenger, break, landing craft, barges, research, coastal patrol and security	400 – <10,000 tonne e.g., large landing craft, small-medium fishery, domestic Ro-Ro, break bulk, bulk, container, tanker, tramp	10,000 – <50,000 tonne e.g., Ro-Ro, deep sea fishery, bulk, container, tanker, car carrier, cruise liner	>50,000 tonne e.g., Very Large Crude Carrier (VLCC), Panamax, Aframax, large container ships
Wind	Soft sails	RF	√√√	√√√	√√√	√√
		NB	√√√	√√√	√√√	√√
	Fixed wings	RF	√√	√√	√√	√
		NB	√√	√√√	√√√	√√
	Rotors	RF	√√	√√	√√	√√
		NB	√√√	√√√	√√√	√√
	Kites	RF/NB	√√	√√	√√	√
	Turbines	RF/NB	√	√	√	√
Solar photovoltaics	Main propulsion	RF	N/A	N/A	N/A	N/A
		NB	√	N/A	N/A	N/A
	Auxiliary propulsion	RF	√√	N/A	√	N/A
		NB	√√	N/A	√	N/A
	Ancillary power	RF/NB	√√	N/A	√	N/A
Biofuels	1st Generation	RF	√√	√√	√√	√
		NB	√√	√√	√√	√
	2nd Generation	RF	N/A	N/A	N/A	N/A
		NB	√√√	√√√	√√√	√√
	3rd Generation	RF	N/A	N/A	N/A	N/A
		NB	√√√	√√√	√√√	√√
Wave	Main propulsion	NB	√	N/A	√	N/A
	Auxiliary propulsion	NB	√	N/A	√	N/A

CURRENT APPLICATION	
	In commercial use
	Proven
	Proof of concept
	Design
	Concept
	Uncertain

POTENTIAL APPLICATION	
√√√	High potential (scores well on all three metrics: economic, environmental and social metrics)
√√	Medium potential (scores on two of three metrics)
√	Limited (scores on one of three metrics)
N/A	Uncertain